Life Event Ontology Based E-Government Service Integration with Privacy Awareness

A Thesis Submitted for the Degree of

Doctor of Philosophy

By

Abdullah Alqahtani

University of Technology, Sydney

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

The advancement of information and communications technology (ICT) and web services offers a promising opportunity for e-government service integration, which can improve the availability and quality of e-government services. One of the key challenges in electronic government (e-government) is the composition of standalone e-government services to achieve complex services. In recent years, the life event model as ontology has been introduced as the core element of integrating complexity of service delivery to improve the efficiency and reusability of e-government services, and web-based information management systems. Despite the conceptual emergence of life event ontology, the question as to how ontology can be used to effectively model life events to support e-government government to citizen service integration remains. Furthermore, privacy concerns represents a major barrier for citizens to accept e-government services, and the question of how to address these privacy issues is becoming increasingly important as the government moves to push service delivery online. Although solutions have been recently suggested in the literature to deal with privacy concerns, there are few practical approaches for helping citizens to create their preferences for privacy protection based on various aspects of privacy policy. These preferences include purpose, retention, consent and the protection of personal information in the context of using e-government services.

As a step forward to satisfy the above requirements and to address some of the current challenges, this thesis presents a new framework for supporting e-government service integration based on a life event model. More specifically, the framework enables the system to automatically discover, select, compose and execute correct service across multiple web applications for appropriate life events and to allow a citizen to set up their privacy preferences and to support computerisation of these preferences so that these preferences can be guaranteed.

The main contributions are fivefold: (i) the proposal of a conceptual framework of e-government service integration based on life events, (ii) the development of a new life-event model using ontology technique and the methodology to model life events as an ontology model for e-government service integration, (iii) the development of a novel citizen personal information sensitivity model with privacy awareness for supporting citizens in expressing their privacy preferences and for granting the protection of citizens' personal information, (iv) the development of a suite of techniques to implement the framework including a practical solution to enforce the privacy policies in relation to citizens' personal information during e-government service integration, and (v) the manifestation of the validity of the proposed framework, models and techniques through the creation of a working prototype of an integrated e-government service system in a specific e-government domain in Saudi Arabia.

The significance of this study can be seen from the fact that it: (i) enables the domain expert to model effective life-events based on the use of ontology building methodology, (ii) enables effective modeling of citizens' personal information, (iii) enables citizens to specify their privacy preferences, (iv) ensures that citizens can be well informed in terms of what information is used, what purpose is it used for, where and how it is stored and who will handle the information, and (v) enforces privacy policies which correspond to the citizens' privacy preferences so that their privacy concerns can be properly addressed and that citizens' personal information will be protected and guaranteed against unauthorized access, loss, misuse or alterations based on their privacy preferences. Based on the outcomes of this study, the integrated e-government systems can significantly improve the accessibility of e-government services and enhance the citizens' trust toward the integrated government e-service systems.

Keywords:

e-government service, service integration, ontology, life event, privacy